Claims

What is claimed is:

1. A system for sensing vibration of a machine, comprising:

a light source for directing a beam of light;

a light receiving system for receiving at least a portion of the beam of light;

a light modulating system for modulating the light beam received by the light receiving system so as to correspond with vibration of the machine; and

a processing system operatively coupled to the light receiving system, the processing system processing the data received from the light receiving system to facilitate determining vibration of the machine.

2. The system of claim 2, the light modulating system including an obstruction modulator adapted to obstruct the beam of light so that only the at least a portion of the beam of light is received by the light receiving system.

3. The system of claim 2, the obstruction modulator obstructing the light beam when the machine is vibrating.

4. The system of claim 2, the obstruction modulator obstructing the light beam when the machine is not vibrating.

5. The system of claim 2, the light modulating system including a housing with a first opening for receiving the light beam, a second opening for passing the at least a portion of the light beam to the light receiving system, the obstruction modulator being disposed within the housing and coupled to the housing by a cantilevered support arm.

6. The system of claim 2, the obstruction modulator being a physical component of the machine.

7. The system of claim 1, the light receiving system outputting a modulated voltage signal indicative of vibration of the machine.

8. A multiple axis vibration detection system, comprising:

a light source for directing a beam of light;

a light receiving system for receiving at least a portion of the beam of light;

a first light modulating system for modulating the light beam received by the light receiving system so as to correspond with vibration of the machine;

a second light modulating system for modulating the light beam received by the light receiving system so as to correspond with vibration of the machine, the second light modulating system being in series to the first light modulating system; and

a processing system operatively coupled to the light receiving system, the processing system processing the data received from the light receiving system to facilitate determining vibration of the machine in a plurality of axes.

9. The system of claim 8, at least one of the first light modulating system and second light modulating system including an obstruction modulator adapted to obstruct the beam of light so that only the at least a portion of the beam of light is received by the light receiving system.

10. The system of claim 9, the obstruction modulator obstructing the light beam when the machine is vibrating.

11. The system of claim 9, the obstruction modulator obstructing the light beam when the machine is not vibrating.

12. A system for sensing vibration of a machine, comprising:

a light source for directing a beam of light;

a light receiving system for receiving at least a portion of the beam of light;

a first waveguide for transmitting the beam of light, the first waveguide adapted to vibrate in response to vibration of the machine; and

a second waveguide having at least a portion thereof located within a predetermined distance to at least a portion of the first waveguide such that evanescent coupling occurs between the waveguides whereby the second waveguide transmit the at least a portion of the beam of light to the receiving system;

wherein the intensity of the at least a portion of the beam of light varies as a function of the vibration of the machine.

13. The system of claim 12, further including a third waveguide having at least a portion thereof located within a predetermined distance to at least a portion of the first waveguide such that evanescent coupling occurs between the waveguides whereby the third waveguide transmits light to a second light receiving system.

14. The system of claim 13, further including a fourth waveguide having at least a portion thereof located within a predetermined distance to at least a portion of the first waveguide such that evanescent coupling occurs between the waveguides whereby the fourth waveguide transmits light to a third light receiving system.

15. The system of claim 14, the second, third and fourth waveguides providing for multiple axis vibration detection.

16. A system

first, second and third light sources for directing beams of light of different frequencies, respectively;

a light receiving system for receiving at least portion of the beams of light;

a first waveguide for transmitting the first beam of light, the first waveguide adapted to vibrate in response to vibration of the machine;

a second waveguide for transmitting the second beam of light, the second waveguide adapted to vibrate in response to vibration of the machine;

a third waveguide for transmitting the third beam of light, the third waveguide adapted to vibrate in response to vibration of the machine; and

a fourth waveguide having at least a portion thereof located within a predetermined distance to at least portions of the first, second and third waveguides, respetively, such that evanescent coupling occurs between the waveguides whereby the fourth waveguide transmits the at least portion of the beams of light to the receiving system;

wherein the intensity of the respective at least portion of the beams of light vary as a function of the vibration of the machine.

17. A system for sensing vibration of a machine, comprising:

a light source for directing a beam of light;

a beam splitter for splitting the beam of light into at least a first beam and a second beam;

an optical lateral resonating system for receiving the second beam , the optical lateral resonator reflecting the second beam, the optical lateral resonating system deflecting in response to vibration such that a transmission path of the second beam varies in length as a function of deflection of the optical lateral resonating system;

a receiving system for receiving an interference beam, the interference beam including a combination of the first beam and reflected second beam; and

a processing system for processing and analyzing the interference beam to facilitate determining vibration of the machine.

18. A system for sensing vibration of a machine, comprising:

means for directing a beam of light;

means for receiving at least a portion of the beam of light;

means for modulating the light beam received by the means for receiving so as to correspond with vibration of the machine; and

means for processing the data received from the means for receiving to facilitate determining vibration of the machine.

19. A system for sensing vibration of a machine, comprising:

means for directing a beam of light;

means for receiving at least a portion of the beam of light;

a first means for transmitting the beam of light, the first means adapted to vibrate in response to vibration of the machine; and

a second means for transmitting light, having at least a portion thereof located within a predetermined distance to at least a portion of the first means such that evanescent coupling occurs between the first and second means whereby the second means transmits the at least a portion of the beam of light to the means for receiving;

wherein the intensity of the at least a portion of the beam of light varies as a function of the vibration of the machine.

20. A system for sensing vibration of a machine, comprising:

means for directing a beam of light;

means for splitting the beam of light into at least a first beam and a second beam;

means for receiving the second beam, means for receiving the second beam reflecting the second beam, the means for receiving the second beam deflecting in response to vibration such that a transmission path of the second beam varies in length as a function of deflection of the means for receiving the second beam;

means for receiving an interference beam, the interference beam including a combination of the first beam and reflected second beam; and

means for processing and analyzing the interference beam to facilitate determining